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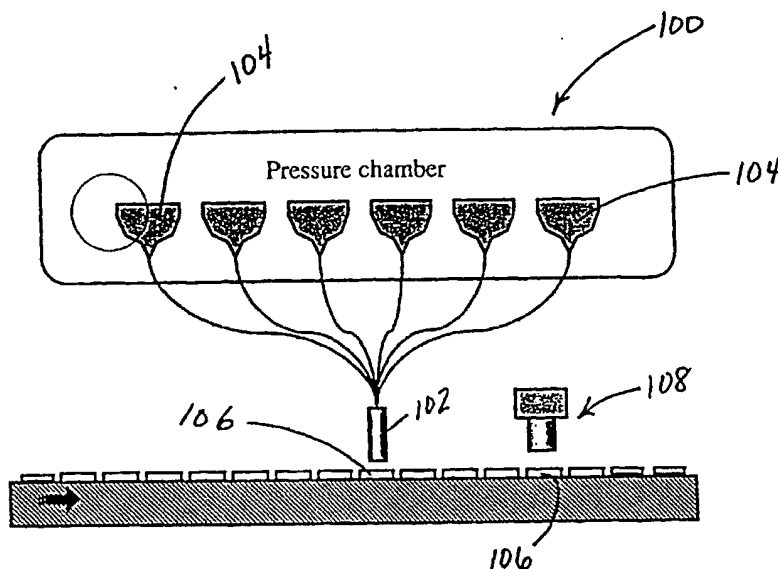
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
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- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian

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(54) Title: **MICROARRAY FABRICATION TECHNIQUES AND APPARATUS**



Schematic configuration of invented microarray fabrication system

(57) Abstract: Disclosed is a microarray printing system and methods of printing probe microarrays 1000. The system has a print-head (102, 606, 706, 806) formed of one or more capillary bundle (104), such as light-guiding capillaries. The bundles (104) may especially be bundles (104) of capillaries that provide a large number of probes 1004 on the surface of a substrate. Methods of registering or correlating the distal 112 and proximal 110 ends of the capillaries are also provided. Further, the invention provides methods and equipment for identifying defective microarrays 1000 that are missing one or more probes from the surface of the microarray 1000.



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patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B01J19/00 B01L3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B01L B01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, COMPENDEX, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MARK SCHENA ET AL.: "Microarrays: biotechnology's discovery platform for functional genomics" TIBTECH, vol. 16, no. 7, 1 July 1998 (1998-07-01), pages 301-306, XP004145643 CAMBRIDGE, UK ISSN: 0167-7799 the whole document ---	52-63
X	MICHAEL B. EISEN ET AL.: "12 DNA ARRAYS FOR ANALYSIS OF GENE EXPRESSION" METHODS IN ENZYMOLOGY, vol. 303, 1999, pages 179-205, XP000995864 SAN DIEGO, CA, USA ISSN: 0076-6879 page 188, paragraph 2 -page 189, paragraph 1 1 --- -/--	52-63

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- *A* document defining the general state of the art which is not considered to be of particular relevance
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/05844

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>BERTRAND LEMIEUX ET AL. : "OVERVIEW OF DNA CHIP TECHNOLOGY"</p> <p>MOLECULAR BREEDING: NEW STRATEGIES IN PLANT IMPROVEMENT ,</p> <p>vol. 4, 1998, pages 277-289, XP000915221</p> <p>NL</p> <p>ISSN: 1380-3743</p> <p>page 277, right-hand column, last paragraph -page.278, left-hand column, paragraph 1</p> <p>page 281, right-hand column, paragraph 3</p> <p>---</p>	52-63
X	<p>MARK SCHENA : "GENOME ANALYSIS WITH GENE EXPRESSION MICROARRAYS"</p> <p>BIOESSAYS,</p> <p>vol. 18, no. 5, 1996, pages 427-431, XP002916033</p> <p>CAMBRIDGE, UK</p> <p>ISSN: 0265-9247</p> <p>page 427, right-hand column, last paragraph -page 428, left-hand column, paragraph 2</p> <p>---</p>	52-63
X	<p>DEVAL A. LASHKARI ET AL. : "Yeast microarrays for genome wide parallel genetic and gene expression analysis"</p> <p>PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE,</p> <p>vol. 94, November 1997 (1997-11), pages 13057-13062, XP002115013</p> <p>WASHINGTON, DC, USA</p> <p>ISSN: 0027-8424</p> <p>abstract; figure 1</p> <p>---</p>	52-63
X	<p>YU-HUI ROGERS ET AL.: "IMMOBILIZATION OF OLIGONUCLEOTIDES ONTO A GLASS SUPPORT VIA DISULFIDE BONDS: A METHOD FOR PREPARATION OF DNA MICROARRAYS"</p> <p>ANALYTICAL BIOCHEMISTRY,</p> <p>vol. 266, no. 1,</p> <p>1 January 1999 (1999-01-01), pages 23-30, XP001005968</p> <p>SAN DIEGO, CA, USA</p> <p>ISSN: 0003-2697</p> <p>abstract</p> <p>page 25, left-hand column, paragraph 3 - paragraph 4</p> <p>page 27, left-hand column, paragraph 2</p> <p>-page 28, right-hand column, paragraph 1</p> <p>---</p> <p>-/--</p>	52-63

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Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 5 807 522 A (PATRICK O. BROWN & TIDHAR DARI SHALON) 15 September 1998 (1998-09-15) cited in the application column 4, line 16 - line 23 column 6, line 32 - line 38 column 9, line 30 - line 45 column 15, line 19 - line 43 ---	52-63
X	WO 98 55593 A (MOLECULAR TOOL, INC.) 10 December 1998 (1998-12-10) page 14, line 11 - line 31 ---	52-63
X	WO 99 40434 A (INVITROGEN) 12 August 1999 (1999-08-12) page 15, paragraph 2 ---	52-63
X	US 5 690 894 A (DANIEL PINKEL & JOE GRAY) 25 November 1997 (1997-11-25) column 3, line 1 - line 30 column 7, line 1 -column 9, line 55 figures ---	52-63
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A	WO 99 55461 A (CORNING INCORPORATED) 4 November 1999 (1999-11-04) cited in the application the whole document ---	1-28,38
X	WO 98 29736 A (GENOMETRIX INCORPORATED) 9 July 1998 (1998-07-09) cited in the application page 22, line 11 -page 24, line 17 page 27, line 6 -page 28, line 15 page 42, line 20 -page 43, line 8 figures 4,4A,4B --- -/--	1-5,8,9, 13,15, 19,21, 22,24, 25,28, 37,38, 52-63

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/05844

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 29-37, 39-63; 1-28, 38 (in part)

In view of the large number and also the wording of the claims presently on file, it is difficult, if not impossible, to determine the exact subject matter for which protection is sought.

The initial phase of the search revealed a very large number of documents relevant to the issue of novelty for the subject matter of microarrays. So many documents were retrieved that it is impossible to determine which parts of the claims may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, a meaningful search over the whole breadth of the claims is impossible.

Moreover, present claims 1-63 relate to an extremely large number of possible capillary bundles, print heads comprising a capillary bundle for printing microarrays, print systems comprising the print heads, methods of forming capillary bundles, methods of making or printing arrays, and microarrays. In fact, the claims contain so many options, variables, and possible permutations that a lack of clarity and/or conciseness within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible.

The present therefore application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible. Consequently, the search has been carried out for those parts of the application which do appear to be clear and concise, namely

I: A print system and a method for forming microarrays, which system comprises a print head formed from a bundle of capillaries, the capillaries being in fluid communication at their distal ends with a plurality of reservoirs, and their proximal ends being adapted for depositing fluids on a support surface, wherein the proximal and distal ends of the capillaries are coated with electrically conductive material, and which system also comprises a voltage source for moving fluid through the capillaries.

II: The method comprises passing fluid through the capillaries by means of a voltage potential between the distal and the proximal ends thereof, thereby depositing fluids in an array on a solid support surface.

Consequently, the search has been restricted to those parts of claims 1-28 and 38 which relate to the subject matter referred to in (I) and (II) above.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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